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THE AUk:

A QUARTERLY JOURNAL OF ORNITHOLOGY.

VOL. VI.

JANUARY, 1889.

No. I.

THE 'BOOMING' OF THE BITTERN.

BY BRADFORD TORREY.

ON the 30th of May last Mr. Walter Faxon and I spent the afternoon in some large meadows in Wayland, Massachusetts where we had the good fortune to witness the musical performances of *Botaurus lentiginosus* under peculiarly favorable conditions. These performances, highly curious in themselves, are not described, so far as I know, in any of our standard ornithological works. Audubon had never even heard them; and neither Wilson, Nuttall, Brewer, nor Coues,—nor any of their correspondents,—appears ever to have seen them. Clearly the Bittern's reputation as a recluse—a "shady character," as Dr. Coues calls him—is well deserved. Yet even he, it would seem, feels now and then an impulse to make a show. On the present occasion, at all events, he may fairly be said to have taken the platform; coming forth from his hiding-place amid the tall meadow grass, and whether he knew it or not, offering to a pair of inquisitive Yankees as protracted and open a view as they could have desired of his most intimate mysteries.

Our first bird, and principal performer, was a pumper, not a stake-driver; that is to say, his notes resembled precisely the noise of an old-fashioned wooden pump. We were on the railway, which runs through the meadow at an elevation of perhaps seven feet above it, and after listening to the bird for some time, and discussing between ourselves his probable distance from us, we walked up the track, hoping to locate the sound more definitely.

By and by this grew so near that we began to wonder whether we might not obtain a sight of its author. We swept the field with our opera-glasses, and presently descried the bird's head erect and motionless amidst the grass. Except for the eye, which we were near enough to see plainly, it might have been a stick. Soon it stirred, and then all at once the fellow commenced pumping. The action was only partially visible, of course; but after it had been repeated several times, the Bittern started towards the remains of a last year's hay-cock, which was still high enough to be entirely above the grass, and while we held our breath he mounted it, looking furtively in all directions, and putting one foot before the other so slowly that we could barely see it move. It was an admirable display of one of the Bittern's most characteristic and useful accomplishments,—the art of imperceptible motion. He got fairly upon the hay at last, where we could see everything but his toes (these he obligingly showed us afterwards) and then he fell again to pumping, and kept at it for at least an hour. This operation, as well as I can put it into words, is as follows.

First the bird opens his bill quickly and shuts it with a click; then he does the same thing again, with a louder click; and after from three to five such snappings of the beak, he gives forth the familiar trisyllabic pumping notes, repeated from three to eight times. With the preliminary motions of the bill the breast is seen to be distending; the dilatation increases until the pumping is well under way, and as far as we could make out, does not subside in the least until the pumping is quite over. It seemed to both of us that the bird was swallowing air,— gulping it down,—and with it distending his crop; and he appeared not to be able to produce the resonant pumping notes until this was accomplished. It should be remarked, however, that the gulps themselves, after the first one or two at least, gave rise to fainter sounds of much the same sort. The entire performance, but especially the pumping itself, is attended with violent convulsive movements, the head and neck being thrown upwards and then forwards,—like the Night Heron's when it emits its *quow*, only with much greater violence. The snap of the bill, in particular, is emphasized by a vigorous jerk of the head. The vocal result, as I say, is in three syllables; of these the first is the longest, and, as it were, a little divided from the others, while the third is almost like an echo of the second. The middle syllable is very strongly accented.

When our bird had been at work for perhaps half an hour a train of cars came along, and as we were sitting squarely upon the track, we of course had to move. This we thought would put an end to the show; but the Bittern held his ground, and as soon as the train had thundered by resumed his amusement, which looked, I am bound to say (and I doubt whether anybody could see it without receiving the same impression), unpleasantly like the contortions of a seasick patient. Between the acts he put himself into various positions; frequently assuming the hump-backed attitude in which the artists have commonly represented him; at other times raising his long neck straight into the air, his body with it, and standing as erect and statue-like as any soldier. Now he faced us; then he stood sidewise; and again he fairly turned his back on us. He was twelve and a half rods away, as nearly as we could tell by pacing; and our opera-glasses, magnifying three diameters, reduced the distance to about seventy feet, while the sun's position was such as to afford us every possible advantage.

This exhibition lasted for something more than an hour, after which the bird suddenly took wing, and flew down the meadow for a short distance, and on alighting in the grass pumped immediately! Within a few minutes he rose again, and again pumped instantly upon alighting. This I thought surprising, in view of the great exertion required, both in rising from the ground and in pumping; but it is, perhaps, analogous to the habit of smaller birds, who in times of excitement are given to breaking out into song the moment they strike the perch.

As we walked down the railroad, on our way back to the station, three Bitterns were in the air at once, and at the same moment a fourth was making music in the meadow on the other side of the track. One of the flying birds persistently let his legs dangle, instead of drawing them up behind him in the ordinary manner. He was high in the air, and I suspected was engaged in showing off, though I have never read of the Bittern's having any such custom.

The second musician, as good luck would have it, was a stake-driver. The imitation was as remarkable in this case as in the other, and the difference between the two performances was manifest instantly to both Mr. Faxon and myself. The middle syllable of the second bird was a veritable whack upon the head

of a stake. I have no difficulty whatever in crediting Mr. Samuels's statement that, on hearing it for the first time he supposed a woodman to be in the neighborhood, and discovered his error only after toiling through swamp and morass for half a mile. On this one point at least, it is easy to see why authors have disagreed. The fault has not been with the ears of the auditors, but with the notes of the different birds. Our stake-driver, however, like the pumper, made use of but three syllables, whatever Mr. Samuels's birds may have done, and the emphasis—the whack—was unmistakably upon the second.

In speculating upon the probable method by which these extraordinary sounds are produced, I have had in mind the following considerations :—

1. The quality of the notes,—resonant, yet curiously hollow and confined, as if emitted under water or under ground, as so many writers have taken for granted.
2. The distention of the breast, *not of the throat.*
3. The violent contortions of the bird.
4. The strong resemblance of the notes to pumping. This, it ought to be said for the benefit of readers who may never have heard them, is not a resemblance to the sounds occasioned by the giving forth of the water, but to those caused by the suction of the air in the tube before the water is brought up.
5. The similarity in kind between the full pumping notes and the fainter preceding ones.
6. The fact that when a man takes air into his stomach, as some men have the knack of doing, the act of gulping is accompanied by a sound extremely like the Bittern's, while the belching of the air out again is attended by a noise quite unlike any which the bird utters.
7. The fact that it is possible to imitate the Bittern's notes (in miniature, of course) by certain quick openings and shuttings of the lips, the breath meantime being inhaled. That this imitation is not imaginary I have satisfied myself by the following tests : First, I tried it upon Mr. Faxon himself, who pronounced it good as to tone and accent, and especially as to the echo-like effect of the final syllable. Then I tried it upon a man who had never heard the bird, and he exclaimed at once, "Why, that sounds like an old pump!"

In view of these things I am inclined to believe (I speak for

myself alone) : 1st, that the sounds are not caused entirely by any ordinary exertion of the vocal organs, but are connected in some way with the distention of the crop. 2d (and somewhat less confidently), that they are produced by the drawing in of the breath, not by the giving of it forth, after the crop is full, the inhalations being attended by forcible openings and shuttings of the beak. That they are not produced under water, or with its help, is sufficiently evident from the fact that our bird remained upon the hay-cock throughout. His bill was never for an instant near any water.

During the hour or more that we sat upon the railway we had abundant opportunity to compare impressions ; and among other things we debated how the notes to which we were listening could best be represented in writing. Neither of us hit upon anything satisfactory. Since then, however, Mr. Faxon has learned that the people of Wayland have a name for the bird (whether it is in use elsewhere I cannot say) which is most felicitously onomatopoetic ; namely, *plum-pudd'n'*. I can imagine nothing better. Give both vowels the sound of *u* in *full* ; dwell a little upon the *plum* ; put a strong accent upon the first syllable of *pudd'n'* ; especially keep the lips nearly closed throughout ; and you have as good a representation of the Bittern's notes, I think, as can well be put into letters.*

The preliminary clicking of the bill, mentioned above, is doubtless the noise that Naumann heard from the European Bittern, without suspecting how it was made. When he got close enough, he says, he sometimes heard a low sound precede the bellow, "as if the surface of the water had been beaten with a reed." Thoreau heard it also, at least on one occasion. He writes in his journal† :

"The stake driver is at it in his favorite meadow. I followed the sound, and at last got within two rods. When thus near, I heard some lower sounds at the beginning like striking on a stump or a stake, a dry, hard sound, and then followed the gurgling, pumping notes fit to come from a meadow. This was just within

* I am aware, of course, that Nuttall and nearly or quite everybody else who has ever described or written the notes, has placed the accent upon the last syllable. Why there should be this discrepancy is to me inexplicable; but there is no point to which Mr. Faxon and I have attended with more carefulness, both on the day in question and since, and there is none on which we are more fully agreed.

† Summer, p. 193.

the blueberry and other bushes, and when the bird flew up alarmed, I went to the place, but could see no water, which makes me doubt if water is necessary to it in making the sound. Perhaps it thrusts its bill so deep as to reach water where it is dry on the surface."

This notion that water is somehow employed in the formation of the sounds seems always to have been pretty general, although Sir Thomas Brown, whose 'Pseudodoxia Epidemica' was published in 1646, treats it even then as a vulgar error. He says* : "That a bitter maketh that mugient noise, or as we term it, bumping, by putting its bill into a reed, as most believe, or as Bellonius and Aldrovandus conceive, by putting the same in mud or water, and after awhile retaining the air by suddenly excluding it again, is not so easily made out. For my own part, though after diligent inquiry, I could never behold them in this motion. Notwithstanding, by others whose observations we have expressly requested, we are informed that some have beheld them making this noise on the shore, their bills being far enough removed from reed or water ; that is, first strongly attracting the air, and unto a manifest distention of the neck, and presently after, with great contention and violence excluding the same again."†

The only American author who has treated the subject as an eye-witness, so far as I can learn, is Dr. C. C. Abbott,‡ and his account of the *action* of the bird is limited to a single sentence. "In this case," he says, "the bird's beak, when it uttered the cry, was not quite withdrawn from the water, and its voice, therefore, was materially modified by this fact"! He makes no allusion to any motion of the head, nor to the inflation of the breast, although the bird was "within ten paces."§

* Book III, Chap. XXVII, 4. For this reference, as well as for much else, I am indebted to the kindness of Mr. Faxon.

† Upon the point of the similarity between the notes of *Botaurus lentiginosus* and those of *B. stellaris* the only direct testimony I have seen is that of Nuttall and Sir John Richardson, two Englishmen who may be presumed to have heard both birds. Nuttall says (Water Birds, p. 61) : "Instead of the *bump* or *boomp* of the true Bittern, their call is something like the uncouth syllables '*pump-aug-gah*', but uttered in the same low, bellowing tone." Richardson's words are (Fauna Boreali-Americanæ, Pt. II, p. 374) : "Its loud booming, exactly resembling that of the common Bittern of Europe."

‡ 'Waste-Land Wanderings,' p. 130.

§ A much more circumstantial though not altogether intelligible description is furnished by Count Wodzicki, in 'Naumannia,' Vol. II, Part II, p. 48, 1852. The bird, of course, is *B. stellaris*. "I saw the female ten paces from the male standing in shallow

Some years ago Mr. William Brewster mentioned to me that he had once detected a Bittern in the act of pumping; and whilst preparing this article I wrote to him requesting some account of the matter. This he has very kindly sent me, and I conclude my paper with his note. His observations, so far as they go, will be seen to confirm those of Mr. Faxon and myself in all essential particulars.

"The only occasion when I have actually seen the Bittern 'pump' was in Rock Meadow, Belmont, Mass., May 16, 1868. The bird was well out in the open meadow among short, green grass growing in perhaps two inches of surface water. I got within less than thirty yards of him before he took alarm and crouched. Previous to this he favored me with several performances in plain sight. He would extend his neck, then drawing in his head suddenly, would throw it out with a jerk as if he were afflicted with violent nausea or were trying to get rid of some obstruction in his throat, at the same time uttering the peculiar *pump-er-lunk*. After repeating the movement and its accompanying vocal notes several times in rather quick succession, he wöuld stand nearly erect for a few moments before beginning again. As he stood with his back partly towards me I could not see his breast or throat distinctly, but I am sure he did not fill the latter with water while I was watching him, for not once did his bill descend low enough to get even a hurried sip.

"You are heartily welcome to make any use you see fit of the above. I am sorry it is so meagre, but I was too untrained an observer at the time to take very full notes, and twenty years is a long time to send the memory back. What little I have said, however, is, I am sure, a correct description of the episode."

water, with neck drawn in and crop inflated, in a *dolce far niente*, like a Florentine *dilettante* who in half-sleep listens to the most beautiful melody. This enraptured female with half-closed eyes had good cause to admire her richly gifted *virtuoso*, for he was a *basso* like Lablache. The artist was standing on both feet, his body horizontal and his bill in the water, and then a rumbling began, the water spiriting about all the time. After a few sounds I heard the *ü* of Naumann; the bird lifted his head, threw it backward, and thrust his bill into the water, and then he uttered a roar so fearfully loud that I was frightened. This explained why some notes, which are heard but seldom and only at the beginning, sound so loud: they are those that the bittern produces when he has taken the water deep into the neck and throws it out with unusual force. The music went on, but the bird no longer threw his head backward, and I heard these loud sounds no more." I make no comments upon this narrative, being entirely at a loss what to say. An extract from it will be found in the 'Standard Natural History,' Vol. IV, p. 176.

NOTE.—Since the foregoing paper was written I have learned, through the courtesy of Dr. Stejneger, that Mr. Frank H. Nutter contributed an account of the Bittern's pumping to the 'Oölogist's Exchange' for April, 1888 (Vol. I, No. 4). I subjoin it in full.

"By the way, did you ever see a Bittern while engaged in its serenade? It is a ludicrous performance. One favored me with it once within easy range of my telescope. After standing in a meditative position for some time it would slowly raise its head and stretch up its neck till its bill pointed nearly straight upwards, when it commenced by several times opening and shutting its big beak with a snap that was plainly heard, though five or six hundred feet distant; it then uttered the characteristic notes from which it takes its common name of 'stake-driver' or 'thunder-pumper'; and truly it seems much like pumping, for each syllable seems to originate deep in the interior of the bird and to be ejected only with the greatest muscular exertion, puffing out its feathers and working its long neck up and down, as if choking to death. After a short season of meditation to recuperate its strength, the performance is again repeated, and doubtless to its mate, engaged in her maternal duties, it is the sweetest of music."

THE MAIN DIVISIONS OF THE SWIFTS.

BY FREDERIC A. LUCAS.

SINCE Dr. Sclater's paper on the genera and species of Swift (P. Z. S., 1865, pp. 593-617) they have been allowed to remain in the two subfamilies, *Cypselinæ* and *Chæturinæ*, into which he there divides this group. Dr. Sclater's divisions are founded solely on external characters, and he is very careful to state that he has paid but little attention to the species of the genera *Collocalia* and *Dendrochelidon*. In a footnote Dr. Sclater refers to a paper by Dr. Bernstein (Acta Academiæ Leopoldino-Carolinæ, Vol. 26, p. 15) as showing conclusively that *Collocalia* is in every point of view strictly *Cypseline*, and most nearly allied to *Dendrochelidon*. While I have not read Dr. Bernstein's paper